Simulation of Coronal Heating in the Presence of a Flow

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We consider numerically the effect of velocity shear on the resonance absorption of compressible MHD waves in the solar corona modeled by a low beta resistive plasma slab (x-y geometry). The simulation results focus on the evolution of MHD waves in coronal loops, The foot point motion in the photosphere is mimicked by a periodic driver. The plasma responds to the footpoint motion by kink or sausage modes depending on the amount of shear present in the magentic field, The larger twist in the magentic field of the loop introduces more fast wave trapping and destroys initially developed sausage-like wave modes. The contour plot of x-component (horizontal component) of velocity in the presence of an equilibrium flow suggests that the kink (shear) reduces in comparison with that in the absence of the flow. Therefore, the flow appears to enhance the resonance heating of the plasma. In the absence of a flow, the velocity y-component (vertical component) exhibits vortex-like structures at one end of the coronal loop which disappear at the other end of the loop as the loop evolves. When the flow is present, the middle of the loop appears to be consisting of small canals of plasma flowing in a virtually incoherent manner. From the Ohmic heating results, we find that the occurrence and the width of the resonance layer increases, which could probably explain the heating of solar corona. Such a study is more realistic as equilibrium flows are always present in the corona,

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